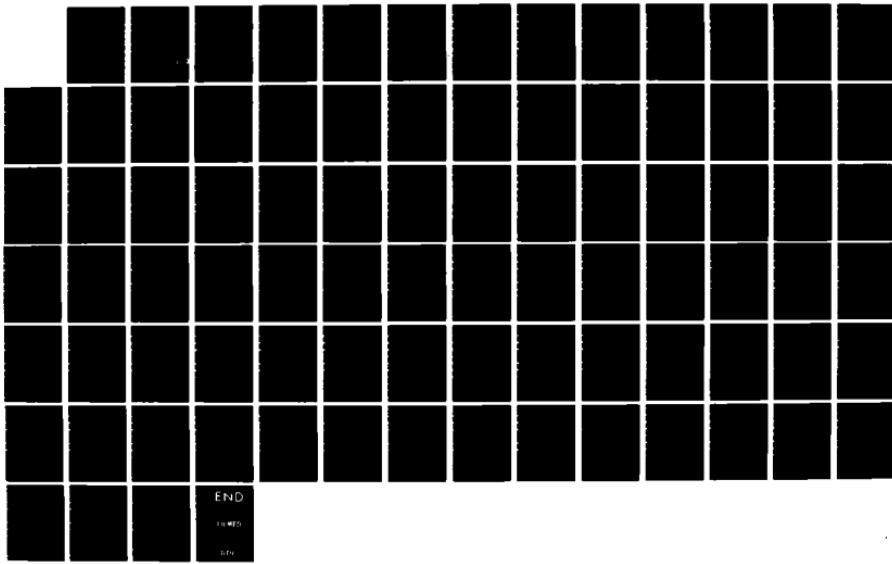
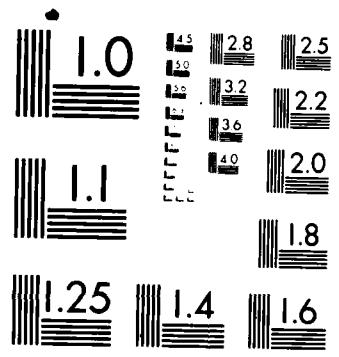


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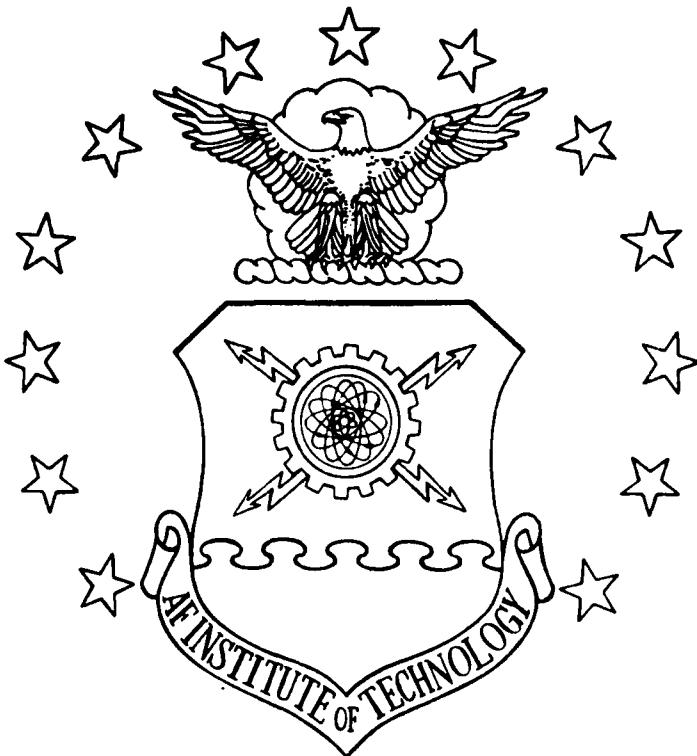
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PARTICIPATIVE DECISION MAKING AND
QUALITY CIRCLES: A LOOK AT THEIR
RELATIONSHIP IN THREE U.S.
GOVERNMENT ORGANIZATIONS

THESIS

James B. Minchello
Captain, USAF

AFIT/GLM/LSB/85S-52

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PARTICIPATIVE DECISION MAKING AND QUALITY
CIRCLES: A LOOK AT THEIR RELATIONSHIP IN
THREE U.S. GOVERNMENT ORGANIZATIONS

THESIS

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Logistics Management

James B. Minchello, B.S.

Captain, USAF

September 1985

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Abstract

The use of Quality Circles (QCs) as an organizational development intervention, has gained increasing popularity over the past few years in the federal sector. Much of the recent attention concerning QCs has been centered around understanding the organizational and attitudinal variables inherent in the QC process. It is theorized that by understanding these variables, researchers are better able to evaluate the effectiveness of QC interventions.

The research effort set out to determine the relationship between one particular attitudinal variable, Participative Decision Making (PDM) and the intervention of QCs. QC programs in organizations within the federal sector were studied utilizing a nonequivalent control group design. Statistical tests used to facilitate evaluation of the data included the independent mean and paired difference t-tests and Cronbach's Alpha Reliability Coefficient technique. The evaluation of the data produced mixed results dealing with the relationship between PDM and QCs.

A better understanding of the QC process and its effects on organizational and attitudinal variables is needed and evidenced by the shortage of research in these areas. By understanding the QC intervention, researchers will be better able to assess its effectiveness.

PARTICIPATIVE DECISION MAKING AND QUALITY
CIRCLES: A LOOK AT THEIR RELATIONSHIP IN
THREE U.S. GOVERNMENT ORGANIZATIONS

I. Introduction

Overview

Several studies surrounding the introduction of Quality Circles (QCs) into governmental organizations have been conducted by organizational scientists from the Air Force Institute of Technology (AFIT). Data from three of these studies will be used in this research effort to try and determine the effect that Quality Circles have on the level of Perceived Participative Decision Making (PPDM) of QC members.

Much attention has been placed on methods to help foster employee attitudes that will ultimately lead to the enhancement of productivity. Quality Circles is one such method, designed to achieve results through the use of a participative management approach. Under the approach, workers are brought together with management to enable them to work as one in reaching the goals of the organization. The underlying philosophy behind the QC concept is that those employees who are closest to the job are best

suited to evaluate its problems and determine the best solutions. Worker attitudes, therefore, play an important role in the effectiveness or success of Quality Circles (Mohr & Mohr, 1983).

A Quality Circle is a group of employees from the same work area who do similar work, meet regularly to identify and analyze work-related productivity and quality problems, and develop and implement solutions (Lail, 1982). Quality Circles first originated in Japan. The Japanese began experimenting with QCs in an effort to enhance product quality and reduce costs (Steel, Mento, Dilla, Ovalle & Lloyd, 1985). As Quality Circles grew in popularity, many American businesses began to recognize their applications and quickly started to adopt them. Today Quality Circles can be found in the manufacturing, service and government sectors of our economy (Mohr & Mohr, 1983).

Participative Decision Making (PDM) is the attitudinal variable analyzed in this study. Because employee perceptions are used to measure the level of PDM, the acronym PPDM is often referred to throughout this study as meaning the level of Perceived Participative Decision Making reported by the employee. Participative Decision Making can be defined as "joint decision making," where at least two persons share the process of making one or more decisions (Locke & Schweiger, 1979). In the context of organizations, PDM refers to a mode of operations in which

decisions about activities are made by the very persons who are to execute them (Lowin, 1968) and, as such, reflects a style of participative management.

The theoretical link between QC's and PDM is complex and is discussed in detail in the next chapter. The complexity exists primarily because theorists have not been able to come up with an absolute description of either term. Depending on their application, the terms Quality Circle and Participative Decision Making can vary in meaning. For instance, Lail (1982) contends that the structure of a QC can vary substantially from one organization to the next. Some of the differences include: size, training, degree of task difficulty, and intervention of the facilitator or QC organizer. In similar fashion, PDM varies according to a number of different factors, including: degree of formality, pressure to conform, directness, content, access to decision and scope. (See Locke & Schweiger, 1979; Lowin, 1968.)

Past research has failed to furnish a definite relationship between QC's and employee levels of PPDM. This research effort will evaluate not only the relationship between QC's and PPDM within each of three organizations from different industry groups, but also across all three organizations. Each of these organizations is a member of the federal sector.

Problem Statement

Several U.S. industries have been plagued by a deterioration of their competitive base, a dismal productivity growth rate and an increase in worker discontent and alienation (Mohr & Mohr, 1983). In an attempt to escape from their dilemma, many of these industries have begun to tailor their management techniques around the Japanese. One particular technique, Quality Circles, has received most of the attention because of its high degree of success in Japan.

There has also been a growing trend in the popularity of Quality Circles in the U.S. Government (Shane, 1984). At last count there were some 15,688 federal workers participating in QCs in a number of different settings (Crawford, 1983). QCs can be found in such areas as intelligence, transportation, administration, maintenance and medicine (Shane & Lloyd, 1984).

A great deal of time and money has been invested in the implementation of QCs in both the commercial and government sectors. While many businesses and governmental agencies have already converted to this new form of management, many others are lined up along the sideline waiting to see if QCs are really worth investing in. Evaluation research on QCs, however, is sparse with little noteworthy progress being made since their first U.S. implementation

in 1974 (Steel, Mento, Dilla, Ovalle, & Lloyd, 1985). The need for a stronger QC research base is evident. Most QC researchers share the view there there is a significant shortage of longitudinal studies and that longitudinal studies, therefore, deserve immediate attention. (See Dean, 1983; Shane, 1984; Steel, Mento, Dilla, Ovalle, & Lloyd, 1985.)

This research effort has been undertaken in response to the need for more longitudinal studies in the QC field. It is hoped that this study will add to the existing body of knowledge on QCs by offering a perspective on the relationship between QCs and PPDM and by providing valuable insight into the generalizability of QC and PPDM effects. When employees are given the opportunity to participate in a decision-making process, ingenuity and creativity are said to result. This, in turn, leads to an improvement in quality and productivity (Mohr & Mohr, 1983). Because QCs are a type of participative management tool, one would expect a relatively high degree of employee PPDM attributable to the QC atmosphere. Previous research, however, has not provided us with any definite relationship between the two. The relationship between QCs and PPDM will be studied here, using three governmental organizations. The following research questions will be addressed:

1. Does an individual's level of PPDM increase over time after practicing in a QC?

2. Do QC members have higher levels of PPDM than non-members?

Hypotheses

The hypotheses presented in this section are designed to help answer the two research questions. Each research question has four corresponding hypotheses which relate to a given sample of data. The research questions are restated below along with their corresponding hypotheses.

Research question #1. Does an individual's level of PPDM increase over time after participating in a QC?

Corresponding hypotheses.

1. The members of the hospital QC work group experience an increase in their level of PPDM after participating in the QC for more than one year.
2. The members of the civil engineering QC work group experience an increase in their level of PPDM after participating in the QC for more than one year.
3. The members of the mint QC work group experience an increase in their level of PPDM after participating in the QC for more than one year.
4. The members of all three QC work groups collectively experience an increase in their level of PPDM after participating in the QC for more than one year.

Research question #2. Do QC members have higher levels of PPDM than non-members?

Corresponding hypotheses.

1. The membership of the hospital QC work group exhibit greater levels of PPDM than do non-members.
2. The membership of the civil engineering QC work group exhibit greater levels of PPDM than do non-members.
3. The membership of the mint QC work group exhibit greater levels of PPDM than do non-members.
4. The membership of the three QC work groups collectively, exhibit greater levels of PPDM than do non-members.

II. Literature Review

Introduction

This literature review is designed to provide the reader with a basis for understanding the two variables analyzed in this research effort--Quality Circles and Participative Decision Making. The review is divided into three sections. It begins with a discussion of QCs; is followed by a review of Participative Decision Making; and ends with a look at the ties between Quality Circles and Participative Decision Making.

Quality Circles

A definition. The literature offers a variety of QC definitions. Although one may differ slightly from the next, there is a group of common threads which link all of the definitions together. They include: small work group, voluntary enrollment, regularly scheduled meetings and group problem solving.

Lail (1982) describes a QC as

a group of employees from the same work area (approximately 5-20) who do similar work, who meet regularly to identify and analyze work related productivity and quality problems, and who develop and implement solutions. (p. 28)

He further contends that the participants are volunteers and that the size of the group is normally about 10.

Stimson and Mossburg (1983) define a QC as

a group of people (ideally seven or eight members), who voluntarily meet together regularly to identify, analyze and solve quality problems (and other problems) in their work area. (p. 42)

Notice that the two definitions are very similar to one another and possess the common threads referred to earlier.

A Quality Circle is also sometimes called a Quality Control Circle. This latter term further delineates the concept of work circle into two parts, quality and control. Both in the U.S. and Japan, quality is viewed as the users' satisfaction and the product's fitness for use (i.e., the customer determines if quality exists). Control, however, carries different meanings to the two countries. While the Japanese see control as a group of activities necessary for efficiently and economically achieving long-term objectives, Americans feel that control implies policing in the work setting and, therefore, tend to resent it. Perhaps this is why the term Quality Control Circle is commonly used by the Japanese, while the U.S. prefers to name them Quality Circles (Rieker, 1982).

In Japan, a QC is defined as (Rieker, 1982):

A small group to perform quality control activities voluntarily (autonomously, spontaneously, independently, willingly) within the same workshop. This small group carries on continuously, as a part of company-wide quality control activities, self development and mutual development, control and improvement within the workshop utilizing quality control techniques with all the members participating. (p. 15)

Notice that the emphasis here is on control. U.S. definitions tend to be more general and avoid the coercive tones of the word control (Cole, 1980).

Quality Circles in the DOD have the same underlying principles as those in the private sector (Shane & Lloyd, 1984). Shane (1984) describes a DOD QC as

a small group of workers (approximately 5-12) who share a common bond (usually members of the same work group) and meet voluntarily on a regular basis to identify, investigate and recommend solutions to work related problems. (p. 1)

This last definition is most fitting in describing the OCs referred to in this paper.

QC process. Most QCs follow a step-by-step process. There are generally seven steps practiced in QCs. They include: identify the problem, define the problem, generate possible solutions, select best solution, acquire approval/support, develop implementation plan, and perform follow-up/evaluation. Individuals from all authoritative levels of the circle communicate among one another and employ their analytical skills (Fuchs, 1981).

Shane (1984) describes this flow in a typical DOD QC:

In the DOD, circles usually meet for an hour each week. The circle team members select the problem they will work on, collect data to analyze the problem, and recommend solutions to management. If management accepts the proposal, the circle usually implements the solution and evaluates the results. (p. 1)

Problems involving quality are most frequently chosen for analysis. Circle members rely on tools such as histograms,

Pareto analysis, cause and effect diagrams and flow charts when studying and analyzing these problems (Stimson & Mossburg, 1983).

In the DOD, the identification of problems is not necessarily performed by the QC group. Sometimes the commander/manager or staff member might propose a particular problem that reflects his/her own concerns. Commanders/managers and others are encouraged to introduce problems and issues to the circle. This normally decreases the time required for the QC concept to become accepted throughout the organization. It also serves to provide a great complement to the circle by having their commander/manager request their help (Konarik & Reed, 1981).

Objectives. The regulation governing productivity improvement, AFR 25-3, states that Quality Circles are simply tools for improving productivity (Shane, 1984). Steel and Shane (1985) hold a broader view on the intents of QCs and contend that their underlying objective "involves furthering the organization's goals in the area of quality control, productivity and employee morale" (p. 3).

Quality Circle initiatives are centered around "unlocking the fullest potential of employee contributions" (Shelby & Werner, 1981, p. 42). QC members play a large role in the resolution and problems and, therefore,

significantly impact the success or failure of QCs. For the past several centuries, managerial philosophy has been structured on the belief that people are childlike and incapable of directing and controlling their own activities within the organization. QCs are aimed towards combating this belief by allowing group members to actively participate in the problem-solving process. This, in turn, is said to provide participants with a greater feeling of contribution to successful projects and provide additional incentives for greater contribution (Lail, 1982). Lieutenant Colonel Lloyd, the head of the AFIT Quality Circle Studies Project, highlights this point by saying that QCs provide "a potential for personal growth" (Cutler, 1983, p. 47).

In addition to the QC objectives to enhance quality control, productivity, and morale, users adopt quality circles for other reasons as well, including:

1. Improved safety.
2. Strengthened teamwork.
3. Better human relations.
4. Opportunity for furthering learning.
5. Improved communication with supervisors.
6. Heightened problem awareness.
7. Increased consciousness to improve status quo.
8. Improved working environment. (Stimson & Mossburg, 1983, p. 42)

Implementing QCs. The implementation of QCs is sometimes referred to as a "go slow" approach because of an organization's need to first develop the right type of

environment. The environment must have a participative climate with both a sharing of power and a decentralization of decision making (Stimson & Mossburg, 1983). Cole (1980) suggests that in the atmosphere surrounding QC's, "work should be seen as a cooperative effort with workers and managers doing the job together" (p. 26). In addition to these environmental characteristics, Dr. Juran, an originator of the Quality Circle concept, believes that two other conditions, awareness of need and acceptance of change, must also be present to successfully implement QC's (Lail, 1983).

Shelby and Werner (1981) have also provided a list of prerequisites that should be followed when an organization is developing and implementing Quality Circles:

- [1] Management must maintain a visible long-term commitment to the program. Circles take from 3 to 12 months to reach a productive state.
- [2] Management must adapt to a basic change in philosophy that accepts and employs participatory management. This will undoubtedly require significant adjustment, but it is essential to success of the program.
- [3] Quality circle implementation and development must permit program survival during management transitions to prevent situations where employees might be reluctant to renew circles.
- [4] Management must rely on volunteers and internal resources to operate and support the program.
(p. 45)

To help facilitate successful implementations of Quality Circles, the Department of Defense has developed a training program for everyone involved. All of the circle participants are trained in problem identification and

resolution for approximately four to eight hours. Circle leaders or "coordinators," must go through additional training, with an emphasis on group dynamics. The QC organizer, sometimes called the "facilitator" receives the most involved training, primarily in QC organization, group dynamics and the behavioral sciences (Lail, 1982).

Evolution and history of QCs. Quality Circles were first introduced in Japan during the post World War II era. Army General Douglas MacArthur was the commander of occupied Japan at this time and responsible for rehabilitating the devastated economy (Konarik & Reed, 1981). After seeing the extremely poor quality of Japanese manufactured goods, MacArthur called on Dr. Edward Deming, a U.S. Government statistician, for help. Dr. Deming trained the Japanese people in many different quality control techniques (Lail, 1982). Histograms, Pareto analysis, cause and effect diagrams and flow charts were the techniques most frequently used (Stimson & Mossburg, 1983). The Japanese were so impressed with the results of Deming's efforts, they honored him by establishing the Deming Prize award, which is presented each year to the company in Japan that achieves the highest standards of quality (Lail, 1982).

Following Deming's lead, Dr. Juran (1956), a leading quality control expert, presented a series of QC lectures in Japan. Dr. Juran directed his lectures on quality

control techniques to middle management levels in an effort to help integrate and expand the quality control process throughout the organization (Blatchley, 1984). "It was this approach to quality which involved everyone in management and formed the basis for the Quality Circle program that emerged several years later" (Konarik & Reed, 1981, p. 36).

From 1956 to 1961, quality training became the main focus of many textbooks, formal courses and radio and television lectures. Quality control was rapidly becoming the responsibility of all working class Japanese (Lail, 1982). Finally, in 1962, the first Quality Circle was developed by a Tokyo University professor drawing off the fundamental principles of Deming and Juran (Konarik & Reed, 1981). During the 1960s, QCs spread throughout Japanese industry. Estimates of the number of functional circles vary. Conservatives argue that there are about 500,000 circles while others speculate that there are more than two million (Blatchley, 1984).

Quality Circles did not make their way to the U.S. until 1974, when Lockheed initiated them in their Space and Missile Division (Stimson & Mossburg, 1983). While it is difficult to obtain reliable numbers, "estimates on the degree of QC activity nation-wide placed the number of private enterprise organizations sponsoring QC programs in

excess of 6,000 by the end of 1982" (Steel, Mento, Dilla, Ovalle, & Lloyd, 1985, p. 102).

In 1978, the first Department of Defense QCs were initiated at Hill Air Force Base, Utah (Konarik & Reed, 1981). QCs have since spread rapidly throughout the federal sector. In the DOD alone, there are an estimated 2,779 QCs (Shane, 1985). The breakdown of these circles in the DOD among agencies is provided in Table 1.

Table 1

DOD Quality Circles by Agency--
1985 Unofficial Estimates

Agency	Number of active circles
Army	500
Air Force	416
Def Log Agency	422
Marine Corps	*
Navy	<u>1441</u>
Total	2779

*Circles are currently in negotiation stage with unions.

Source: G. S. Shane, briefing presented to AF/MPM,
April 1985.

Studies on QC's are in serious short supply as previously mentioned. Shane (1984) concludes that "we need more studies . . . before we can advocate this process (QC's)" (p. 5). Of the existing evaluative studies, many are unreliable due to weak research designs, poor control, and statistical irregularities (Steel & Shane, 1985).

Some of the studies conducted in the past include: Horn's study of a naval rework facility, Hunt's evaluation of a QC pilot program at General Dynamics, and Tortorich et al.'s investigation of QC's at the Michaud Division of Martin Marietta. Each of these cases, however, produced inconclusive results due to the study's lack of statistical validity (Blatchley, 1984).

More recent studies, utilizing a nonequivalent control group design, have been successful in controlling for statistical conclusion validity (Blatchley, 1984). Sander and Atwater established new standards of empirical rigor in QC evaluative research (Steel & Shane, 1985) in their study of three U.S. Navy organizations. Organizational behavioralists from AFIT have furthered the rigorous standard set by Sanders and Atwater in their QC evaluations of DOD organizations. Their studies of QC's are said to be the most advanced of all evaluative research (Blatchley, 1984).

Participative Decision Making

A definition. Participative Decision Making (PDM) is a concept which specifically refers to participation in the process of making a decision. There is little consensus on the exact meaning of PDM. For example,

American social scientists define PDM as a specific managerial style while European writers see it as a legally mandated mechanism for employees to influence delegation. (Locke & Schweiger, 1979, p. 273)

Locke and Schweiger (1979) contend that the common element which stands out in many of the PDM definitions is the equilization of influence or a power-sharing concept.

It is important to understand the meaning of participation since it is so much a part of PDM. Davis (1967) defines participation to be "the mental and emotional involvement of a person in a group situation which encourages him to contribute to group goals and share responsibility in them" (p. 128). There are three important elements to Davis' definition. First, the person is induced by psychological rather than physical factors; it is mental and emotional involvement instead of skill. The second element is that the employee is motivated to provide his contributions to the situation. The employee is utilizing his creativity and knowledge towards the objectives of the organization, rather than simply issuing his consent. The last element of Davis' definition is that participation influences individuals to partake in group

activities by accepting responsibility within the group (Davis, 1967).

The Oxford English Dictionary's definition of participation is:

1. The action or fact of partaking, having or forming a part of; the partaking of the substance, quality, or nature of some thing or person.
2. The fact or condition of sharing in common (with others or with each other); association as partners, partnership, fellowship; profit sharing.
3. A taking part, association, or sharing (with others) in some action or matter.

Note that the second meaning is more appropriate when referring to the context of organizations. It suggests that, first, there be more than one person involved and, secondly, that a common bond exist between the persons or parties (Locke & Schweiger, 1979).

Now that participation has been defined, a definition for Participative Decision Making is straightforward. PDM is a mode of "joint decision-making" under a participative climate. Decisions are made by a group of people with each member of the group having an input toward the final decision (Locke & Schweiger, 1979). A slightly different perspective is suggested by Lowin (1968) who defines PDM as "a mode of organizational operations in which decisions as to activities are arrived at by the very persons who are to execute those decisions" (p. 69). Lowin also argues that PDM is a relative term and that locus of control or decision influence between

organizational levels can vary in degree. A third view of PDM is offered by Turney and Cohen (1980) who have defined PDM

as a continuum with managers varying the level of employee participation according to immediate task requirements, participant characteristics, situational conditions, and likely task outcomes. (p. 42)

The last two definitions offered by Lowin and Turney and Cohen clearly address the relativity of PDM. While all three definitions appear reasonable, Lowin's definition seems the most comprehensive and, therefore, will be used for this study.

Elements of PDM. PDM can vary from one organization to another depending on what properties of participation are present. The literature on PDM suggests that there are six broad properties of participation. They include:

1. The degree to which participation is formally structured.
2. The amount of force levied on employees to participate.
3. The extent of personal involvement of employees in decision making.
4. The content of decisions made by the employees.
5. The degree of access or influence employees have to actually make a decision.
6. The scope or size of the decisions made by the employees.

Formal participation implies a system of rules and agreements where events are explicitly recorded (Dachler & Wilpert, 1978) and the decision-making bodies are officially recognized. On the other hand, an informal system would involve an absence of specific standards and guidelines and focus more on the personal relationship between the actors involved (Locke & Schweiger, 1979). Lowin (1968) describes the actors primarily as

two parties most directly concerned with an instance of PDM: the manager and his subordinate (the subordinate may, in turn, be someone else's manager). What is crucial is that these actors occupy positions at different levels in the authority structure. (p. 69)

PDM may also be implemented by force or on a voluntary basis. Force would be said to be present if a law or government decree existed as if contracts, say, between unions and management, legally obligated a form of PDM. Voluntary PDM would be similar to most Scanlon Plans, where PDM is initiated by management and accepted by all of the acting employees (Locke & Schweiger, 1979).

Dachler and Wilpert (1978) contend that "the immediate, personal involvement of organization members in decision making is ultimately the ideal form of participation in all theoretical frameworks" (p. 12). What they are referring to is direct participation. This form of PDM is "usually of the shop floor variety" (Locke & Schweiger, 1979, p. 275) where individuals at even the lowest levels

of an organization participate in making decisions that will ultimately affect them. Indirect participation involves some form of representation for employees like a union negotiator or shop foreman participating with management in reaching decisions.

The content of PDM depends on the type of issue that needs to be resolved. For instance, management may only allow lower level workers to participate in low level decisions and not in company policies and objectives. Locke and Schweiger (1979) categorize the types of decisions that normally fall under PDM schemes into four groups:

1. Routine personal functions: hiring, training, payment methods, discipline, etc.
2. Work itself: task assignments, work methods, job design, speed of work, etc.
3. Working conditions: rest pauses, hours of work, placement of equipment, lighting, etc.
4. Company policies: layoffs, profit-sharing, wage levels, executive hiring, dividends, etc.
(p. 276)

The access individuals have toward a decision can vary from one setting to the next. Some authors equate access with influence when describing an individual's role in the decision-making process. Access can best be described by placing it on a continuum. At one extreme (high end of continuum), an employee can have complete access to a decision, meaning he has all of the necessary information and power to make a decision. At the other extreme (low end of continuum), he may have no access;

i.e., no information and no input into the decision (Dachler & Wilpert, 1978).

The last general property of participation deals with the scope of the decision. This refers to the size of the problem the decision encompasses (i.e., the larger the problem, the larger the scope). Scope is also used to describe the stage of the problem-solving process where PDM takes place (Locke & Schweiger, 1979).

The properties of participation should interact with one another to best fit the organizational structure and interests of the acting authority. PDM is considered an organizational treatment or intervention strategy and, therefore, it must be tailored to the needs of the organization (Dachler & Wilpert, 1978). In addition to deciding which PDM properties to instill in a specific program, the designers must also insure necessary conditions are present to facilitate their desired degree of participation. Davis (1967) proposes a number of conditions that must be present in a work unit before total participation can be met. Although few managers would wish to have a state of total participation, Davis' conditions can offer them an enlightening perspective. The conditions include:

1. There must be time to participate before action is required. Participation is hardly appropriate in emergency situations.
2. The financial cost of participation should not exceed the values, economic and otherwise, that come from it. Employees cannot spend all their time participating, to the exclusion of all other work.

3. The subject of participation must be relevant to the participant's organization or something in which he is interested, else he will look upon it merely as busy work.
4. The participant should have the ability, such as intelligence and knowledge, to participate. It is hardly advisable, for example, to ask the janitor in a pharmaceutical laboratory to participate in deciding which of five chemical formulas deserves research priority; but he might participate in other problems related to his work.
5. The participants must be able mutually to communicate--to talk each other's language--in order to be able to exchange ideas.
6. Neither party should feel that his position is threatened by participation. If a worker thinks his status will be adversely affected, he will not participate. If a manager feels that his authority is threatened, he will refuse participation or be defensive.
7. Participation for deciding a course of action in an organization can take place only within the group's area of job freedom. Some degree of restriction on subunits is necessary in any organization in order to maintain internal unity. Each separate subunit cannot make decisions which violate policy, collective-bargaining agreement, legal requirements, and similar restraints.
(p. 131)

PDM objectives. Greenberg (1980) suggests that work organized into hierarchies of uneven power can prove damaging to individuals located at the bottom of such hierarchies. Under these circumstances, individuals at low organization levels are characterized by an absence of autonomy and powerlessness. He further argues that this often results in a wide range of problematic behavior, attitudinal and psychological developments.

PDM has become a management technique that has been widely advocated, both on an ideological basis and as a

direct means to increase the effectiveness of today's workers and to prevent such problematic developments from occurring. Theorists believe that participation contributes to increased work effectiveness by two different means (Porter, Lawler, & Hackman, 1975):

1. It can increase the amount and accuracy of information that workers employ in doing their job.
2. It can increase the degree to which a worker feels he is more involved and, in a sense, "owns" his work practices.

Locke and Schweiger (1979) categorize the PDM objectives into two groups. The first group consists of increased morale and job satisfaction and their resulting benefits. The second group includes the benefits derived from an increase in productive efficiency. After an exhaustive literature review on PDM, they concluded that

research findings yield equivocal support for the thesis that PDM necessarily leads to increased satisfaction and productivity, although the former outcome is stronger than the evidence for the latter. (p. 325)

Evolution and history of PDM. Social Scientists Rothlisberger, Bavelas, Coch and French were the first to make classic studies on the various effects of participation in industry. Rothlisberger originally meant to show the relationship between physical changes in the environment and output. While conducting the experiment, however, he began to notice the effects of relationships between

(1) workers and the experimenters, and (2) workers and the supervisors. It was found that social changes had boosted both productivity and morale. Bavelas, Coch and French found similar results (Davis, 1967).

In 1947, Lewin took the cue from these studies and centered it on a more specific type of participation, participative decision making. His work became very popular in the literature and inspired countless studies in the field (Lowin, 1968).

PDM has since evolved into a way of life for many U.S. workers. A large number of American businesses have made the switch to a more decentralized and consensus type of management structure which allows their employees to openly participate in the decision-making process (Moss, 1982). The new participative climate has been termed by many as a type Z (Modified American) democracy (Staw, 1983).

The amount of PDM literature that exists today seems never-ending. Locke and Schweiger (1979) conclude that "the PDM literature is so enormous that to achieve a 'complete' review is virtually impossible" (p. 280). Two of the most comprehensive PDM reviews in the literature today have been accomplished by Locke and Schweiger (1979) and Lowin (1968).

QC-PDM Link

Differentiating between PDM and QCs. Quality Circles and Participative Decision Making are not interchangeable terms. Although there are some similarities between the two, they do take on different meanings. Some authors have attempted to clarify the distinctions with interpretations of their distinguishing features. Dean (1983) argues that while PDM can vary in form with respect to its parameters, QC parameters are generally fixed. For instance, PDM may be either (1) forced or voluntary, (2) formal or informal, and (3) direct or indirect. QCs, on the other hand, are normally characterized as voluntary, formal, and indirect with regard to the same parameters. Dean cautions that we should not try and "compare PDM with quality circles, because it (PDM) is a concept which includes many forms of change, including circles" (p. 8).

Dean's comments suggest that QCs are only one form of PDM designed for the organization. This view is supported by other authors as well. Mohr and Mohr (1983) note that "QCs are implemented to reap the benefits of PDM" and that "the quality circle is a force of participative management" (p. 139). Shane and Lloyd (1984) describe a DOD QC as a "participative management approach" (p. 1) and Cole (1980) contends that a QC is a "form of worker participation in decision making" (p. 42).

Not all authors, however, support the view that QCs are a form of PDM or participative management. Ross and Ross (1982) dismiss this theory as a myth and argue that QCs have a uniqueness all to themselves in that they emphasize both problem identification and solution.

While it is true that QCs possess their own unique characteristics, the literature supports the precept that they are a form of participative management and do employ PDM. The popular "go slow" approach to implementing QCs further supports this conceptualization. The approach is based on the need to first create a participative climate within a company which involves both a sharing of power and a decentralization of decision making (Stimson & Mossburg, 1983). It should be pointed out though, that PDM is only one part of the participative process in QCs. Participation in problem solving is also said to take place as well (Dilla, 1984).

Individual needs to participate in QCs. Quality Circle participants generally experience better feelings toward the organization when they are allowed to participate in the decision-making process. This is said to result because their ideas, which are recognized and acted upon, can be more closely linked to the organization's success (Lail, 1982). Because almost all QCs are voluntary, individuals decide whether or not to join them

based on their perceptions of potential benefits. One such benefit, the opportunity for greater involvement, appears to be an important one in that it influences individuals to join QCs.

Dean (1983) researched the motives behind an individual's decision whether to join a Quality Circle. He found that

individuals join circles because they desire greater involvement in the organization, and because they believe that circles will promote better productivity, quality, working conditions, and greater involvement. (p. 108)

The need for greater involvement can be transitioned into the need to participate. It logically follows that an individual who participates in the decision-making process would be more involved than one who doesn't, holding all other variables constant. An evaluation of a QC program in a Naval Weapons Support Center adds credence to this assumption. The study found that respondents selected the promotion of employee decision making as a primary benefit of QCs (Gill, 1983).

Expectations of PPDM levels in QCs. The last two sections summarized two important points. The first is that Quality Circles represent a form or style of participative management. Circle members actively participate with management in the problem-solving process and in the organization. The second point is that individuals join

QCs in order to help fulfill their need for involvement in the PDM process.

Both of the points discussed above form a strong basis for the argument that circle members should experience significant levels of Perceived Participative Decision Making. This line of thought is in direct support of the hypotheses stated in Chapter I. After all, if QCs involve PDM, then it is logical to expect that the participants will recognize this fact. And secondly, since QCs are voluntary and individuals join them with the intent of participating in the decision-making process, we would expect their intentions to match their efforts. In other words, we would expect individuals to be more apt to participate in the decision-making process if their intentions were to do just that.

One aspect of QCs that deserves mention when discussing the expectations of PPDM levels is the access individuals have to making a decision. The degree of access or influence employees have towards making decisions is one of the six properties of Participative Decision Making mentioned earlier. QC members do not generally have the power or authority to make final decisions, placing them on the low extreme of the access continuum. Although employees in QCs may go through part of the decision-making process, they normally do not have control over the

final decision. Instead, QCs merely recommend to management what decision should be made.

Individual levels of PPDM may, in fact, be affected by the degree of access prevalent in their QCs. It is expected that QC members would experience higher levels of PPDM if their recommended decisions are accepted and implemented. If QC recommendations are routinely discarded by management, employees may become discouraged and perceive their role to be a minor one in the decision-making process. In this case, levels of PPDM would be expected to be relatively low.

Unfortunately, there is little empirical evidence to support or contradict the argument that QCs lead to increased levels of employee PPDM. It is hoped that this study will help fill in this gap in knowledge. A review of past research concerning this subject is presented in the next section.

Past research on QC-PDM link. There are very few studies that are known to exist on the ties between QCs and PDM. The majority of these studies have been conducted by researchers from the Air Force Institute of Technology. In each of these evaluations, PPDM was only one among many attitudinal and behavioral variables being measured in the QCs. Most of the experimental designs were of the longitudinal type.

Steel, Mento, Dilla, Ovalle and Lloyd (1985) evaluated the same two U.S. Army organizations being utilized in this research effort. They found different results for their two samples. The maintenance sample showed a significant increase in the members' level of PPDM after practicing in their QC. The hospital sample, however, failed to show any change. Shane (1984) notes that the hospital's poor showing may have been due to an improperly managed QC. In another study, Steel (1984) tested for QC effects at three organizations located at an Air Force base in California. In the initial analysis, no significant results on PPDM levels were found between control and QC groups. In a supplemental analysis, however, researchers found significantly higher levels of PPDM in active members of the QC groups than in members of the control group.

Blatchley (1984) analyzed the impact of QCs on seven attitudinal variables, one of which was PPDM. The setting was at an Air Force base in the western U.S. The results failed to show any significant effects (PPDM included) attributable to the QC treatment. Poor implementation of the circles was suspected to be a cause for the nonsignificant results. A study by Seger and Mucklow (1985) utilized a cross-sectional design in evaluating QCs made up of civil service employees in the DOD. They did not find any significant differences in PPDM levels between the control

and QC groups. Other studies by Roffey and Lyu (1983) and Sander and Atwater (1983) also failed to show any significant changes in PPDM levels attributable to the QC interventions (Steel & Shane, 1985).

For the most part, past QC research failed to show a significant relationship between employee levels of PPDM and QCs. In response to the small number of significant findings on this subject, Steel and Shane (1985) argue that "The majority of studies constituting the Quality Circle evaluation literature are at best seriously flawed and at worst potentially misleading" (p. 3).

III. Method

Samples and Settings

Three organizations within the Department of Defense served as the samples in this study. Two of them are collocated at a U.S. Army installation and the third one is located at a government mint. Of the two Army samples, one consisted of individuals from the base maintenance organization and the other of base hospital personnel.

The maintenance personnel were all skilled tradesmen with jobs in plumbing, carpentry, electrical, and so on. A total of 107 employees (100 males, 7 females) formed the sample for this group with all but one belonging to the civilian work force. The other individual was an active duty military member. The average respondent in this group was male, age 31 to 40, with between 2 to 3 years of employment with the organization (Steel, Mento, Dilla, Ovalle, & Lloyd, 1985).

The hospital sample was comprised of 165 personnel of which 65 were males and the other 107, females. There were a total of 118 civilian employees and 47 active duty military service members in this group. ... typical employee was female, age 26 to 30, with between 1 to 1.5 years of employment. Sample personnel performed a variety

of health care and supporting services within the medical facility (Steel, Mento, Dilla, Ovalle, & Lloyd, 1985).

The third sample, the government mint, included 281 employees. These individuals performed a wide range of services in the production of U.S. currency. The sample population was made up of 262 males and 19 females, all of which belonged to the civilian work force. The average respondent was male, age 41 to 50, with more than 3 years on the job.

Measurement Instrument

A survey questionnaire was utilized to secure both baseline and follow-up data. This broad-based survey, the "AFIT Survey of Work Attitudes," was developed by the AFIT faculty for the sole purpose of studying QC interventions. It is comprised of 137 items designed to collect demographic data and information on attitudinal and behavioral variables. Responses to the demographic items are obtained on either nominal or interval scales while the rest of the data is recorded on five- or seven-point Likert scales.

For the purposes of the current study, only two sections of the survey, Demographic Characteristics and Participative Decision Making, were utilized. The section on demographics was used with two objectives in mind. The first was to determine the makeup of each of the groups. This was done by the use of seven questions concerning the

individual's age, education level, sex, tenure, supervisory status, classification (e.g., civilian or military type) and grade level. These questions can be found in Appendix A.

The second objective behind the use of the demographic measurements was to detect any differences that might be present between the control and experimental groups. Differences in demographics between the two groups could possibly distort the measured effects of QC interventions. By controlling for demographics, the researcher is better able to isolate the effects due solely to the interventions. Emory (1980) advocates the comparability of pretest results in order to get an indication of their equivalency. He contends that the internal validity of the experiment will be enhanced if the pretest is not found to be statistically different.

The PDM section of the survey consisted of five statements that respondents were asked to rate on a 7-point agree-disagree scale. These items were designated solely for the purpose of measuring the degree of Perceived Participative Decision Making of respondents. The five items are presented in Appendix B.

Research Design

Emory (1980) classifies a group of research designs as "quasi-experiments." Such designs are often used by

researchers when equivalency cannot be established between experimental and control groups. One of the most powerful designs in this group is a longitudinal design called the Nonequivalent Control Group Design. A variation of the Nonequivalent Control Group Design has been opted for this study. The variation "intact equivalent design," is advocated by Emory (1980) when "the experimental and control groups are naturally assembled" (p. 344). Members of each of the three organizations studied here were assembled into QC and control groups on a strictly voluntary basis rather than by random assignment. Those who chose not to join the QC group were classified as belonging to the control group. Because of these conditions, equivalency between the two groups could not be established.

A diagram of the Nonequivalent Control Group Design is depicted below (Emory, 1980, p. 347).

01 X 02
— 03 — 04

The symbols 01 and 02 represent pre- and posttest observations of the experimental group. The X notation identifies an experimental stimulus; in this case, a QC intervention which is introduced between the two observations. The other two symbols, 03 and 04, refer to the pre- and posttest observations of the control group. No

stimulus is entered here. The dashed line in the diagram indicates that the groups were not selected randomly but by some other means (Emory, 1980).

Data Analysis

This section discusses the statistical procedures chosen to analyze the data of this project. Three different tests were employed, including Cronbach's alpha reliability coefficient, the mean difference t-test between independent means and the paired difference t-test.

Cronbach's alpha reliability coefficient. The reliability of the measurement instrument is of particular importance to us, since our analysis and conclusions depend so heavily upon it. The Cronbach technique is one way of testing an instrument's reliability by measuring the internal consistency of the responses to a given group of questions. In our case, the five questions concerning an individual's level of Perceived Participative Decision Making will be tested using this technique. The reliability coefficient for the PPDM questions is listed in Table 2 for each one of the samples.

Mean and paired difference t-tests. The mean and paired difference t-tests are ideally suited for cases like ours where it is desired to know the difference between samples possessing interval data. The mean

Table 2

difference t-test is used in this study to identify differences in demographics and PPDM levels between the treatment and control groups. The demographic variables were compared in the pretest in order to measure the equivalency between the two groups. Each PPDM variable is similarly compared in the pretest for the same reason. The PPDM variable is compared at the posttest to determine the effects of QCs on PPDM. Paired difference t-tests are conducted between the pre- and posttest of the QC and control groups. The purpose was to try and detect any differences in PPDM over time due to the QC intervention.

Variables. The measurement instrument, shown in Appendices A and B, collected the data on the PPDM and demographic variables used in this study. There were a total of five questions used to create the PPDM variable. The response scales used for each of the questions were

the same; a seven-point agree-disagree Likert scale. The five questions were summed together for each respondent and then a mean was calculated for the particular sample.

The demographic variables included: Age, education level, sex, tenure, supervisory status, classification, and grade level. Data was collected for each of these variables by the use of a single question. Sample means were computed for each of these variables.

Age. There were seven different ranges of age in which respondents had to choose from. The choices varied from less than 20 years old (1) to more than 60 years old (7).

Education level. The question used to measure the respondents' education level ranged from non high school graduate (1) to a doctorate degree (8).

Sex. The respondents indicated their sex by either marking a 1 for male or 2 for female.

Tenure. The question on tenure was in terms of the total number of months the respondent worked at his/her organization. The choices ranged from less than one month (1) to more than 36 months (7).

Supervisory status. To determine supervisory status, respondents were asked to indicate the number of

people they directly supervise. The choices ranged from none (1) to 21 or more (7).

Classification. The classification of respondents refers to their service titles. The choices included: Officer (1), Enlisted (2), Civilian-G5 (3), Civilian-WG (4), NAF (5), and Other (6).

Grade level. The question used to determine a respondent's grade level offered eight different choices. Each choice consisted of two grade levels. For instance, if a respondent chose response number 1, he could either be a 1 or 2 grade level.

IV. Results

Introduction

The results of this study were obtained through the use of the Statistical Package for the Social Sciences (SPSS). The SPSS proved ideal for processing the large amount of sample data obtained from each of the three organizations.

Groups Equivalency Analysis

Demographics. The identification of differences between the control and treatment groups was important at the pretests in order to strengthen the level of internal validity of this study. The mean difference t-test was the vehicle employed to test for equivalency between the two groups.

The demographic results from the mint organization are presented in Table 3. Aside from a significant difference in the grade level variable, there is little evidence to suggest that the groups are not equivalent. A threshold of $p = .05$ was used to determine significance. It should be noted, however, that the grade level difference may prove to have a significant impact on the PPDM and QC relationship we are seeking.

Table 3
Demographic Analysis--Mint Organization

Variable	Control group		QC group		t-statistic
	M	SD	M	SD	
Age	5.03	1.30	4.86	1.17	1.03
Education	2.84	1.33	2.64	1.08	1.26
Sex	1.16	.66	1.11	.57	.68
Tenure	6.73	.83	6.60	1.12	.91
Supervisory status	1.66	1.36	1.68	1.70	.10
Classification	3.92	.88	4.00	.83	.68
Grade level	3.87	1.36	3.56	1.02	1.97*

*p < .05.

Control: 102 \leq N \leq 108.

QC: 128 \leq N \leq 131.

Table 4 contains the results from the civil engineering (CE) organization. Only one variable, education, was found to be significantly different between the control and treatment groups. Again, there appears to be little evidence to suggest the groups are nonequivalent despite the difference in education level.

The results of the hospital sample are presented in Table 5. No significant differences were found between the control and treatment groups. This suggests they are, in fact, equivalent with respect to their demographic characteristics.

After the demographic data from each of the three organizations were analyzed, the next step involved pooling the three samples together into a single unified sample. This was done to allow for testing across the three organizations. The results of the pooled sample are depicted in Table 6. Once again, only one of the seven demographic variables, grade level, was found to differ in intensity between the control and treatment groups. Much of the significant difference for grade level is likely due to the inclusion of the mint sample, where the grade level was also found to be significantly different between treatment and control groups.

PPDM level. The second method used to test the groups' equivalency also involved a mean difference t-test.

Table 4
Demographic Analysis--CE Organization

Variable	Control group		QC group		t-statistic
	M	SD	M	SD	
Age	4.67	1.41	4.61	1.06	.25
Education	1.90	.67	2.52	1.44	2.64*
Sex	1.10	.45	1.03	.17	.80
Tenure	6.31	1.52	6.60	.94	1.06
Supervisory status	1.16	.76	1.38	1.24	1.00
Classification	4.00	.59	3.94	.24	.56
Grade level	4.84	.64	4.75	1.02	.51

*p < .05.

Control: 51 \leq N \leq 52.

QC: 32 \leq N \leq 33.

Table 5
Demographic Analysis--Hospital Organization

Variable	Control group		QC group		t-statistic
	M	SD	M	SD	
Age	3.89	1.24	3.69	1.37	.99
Education	2.92	1.13	3.00	1.29	.41
Sex	1.71	.49	1.61	.51	1.35
Tenure	5.22	2.04	5.03	2.05	.58
Supervisory status	1.23	.77	1.35	.95	.88
Classification	2.83	.49	2.78	.89	.41
Grade level	2.72	1.06	2.78	1.20	.33

*p < .05.

Control: 63 \leq N \leq 64.

QC: 95 \leq N \leq 99.

Table 6
Demographic Analysis--Pooled Sample

Variable	Control group		QC group		t-statistic
	M	SD	M	SD	
Age	4.49	1.34	4.41	1.45	.70
Education	2.65	1.23	2.81	1.27	1.42
Sex	1.32	.65	1.31	.59	.02
Tenure	6.05	1.77	5.95	1.76	.64
Supervisory status	1.62	1.45	1.50	1.41	.88
Classification	3.58	.99	3.48	1.00	1.15
Grade level	3.75	1.30	3.49	1.28	2.20*

*p < .05.

Control: 240 ≤ N ≤ 243.

QC: 240 ≤ N ≤ 249.

This time, the t-statistic for the variable, Participative Decision Making, was computed for the control and QC groups at the pretest. If no difference is found between the two groups, they would be considered equivalent with respect to their level of Perceived Participative Decision Making.

Table 7 contains the results for the individual and pooled samples of the three organizations. The mint sample yielded a significant result at the .05 alpha level. The mean level of PPDM in the control group is substantially higher ($\mu = 18.32$) than that of the QC group ($\mu = 15.63$). This raises serious questions as to the samples' equivalency between control and QC groups. The implications of this difference are discussed in further detail in the next chapter. There is no evidence in the other organizations to suggest that the control and QC groups differ at the pretest.

Analysis of QC Effect on PPDM

This section looks at the results of selected tests that attempt to isolate the effects attributable to the QC interventions. A mean difference t-test is used to compare the posttest data between the control and QC groups. A paired difference t-test is used to compare pre- and posttest data between either the control or QC group. The research questions from Chapter I will be

Table 7
 QC and Control Groups--By Organization;
 PPDM--Pretest Survey

Sample	Control			QC			t-statistic
	N	M	SD	N	M	SD	
Mint	103	18.32	9.34	129	15.63	8.20	2.30*
CE	47	21.77	7.34	33	22.06	6.69	.19
Hospital	64	20.55	8.57	98	20.20	7.71	.26
Pooled	236	19.58	8.65	243	18.24	8.34	1.72

*p < .05.

restated along with their corresponding hypotheses and results. The results are displayed in Tables 8 through 10.

Research question #1. Does an individual's level of PPDM increase over time after participating in a QC?

Hypothesis one. The members of the hospital QC work group experience an increase in their level of PPDM after participating in the QC for more than one year.

Results of the paired difference t-test between the pre- and posttests of the QC groups are displayed in Table 8. Measures taken at the hospital posttest failed to differ significantly from those taken at the pretest a year earlier. Thus, the hypothesis could not be substantiated. The control group revealed similar results over this same time period. These findings are summarized in Table 8 and 9.

Hypothesis two. The members of the civil engineering QC work group experienced an increase in their level of PPDM after practicing in the QC for more than one year.

Despite a fairly high t-statistic ($t = 1.93$) between the pre- and posttests of the CE QC groups, the results failed to be significant at the .05 level. The hypothesis, therefore, was not substantiated by the results. A check

Table 8
 QC Groups--By Organization;
 PPDM--Across Time

Sample	Pretest		Posttest		t-statistic
	M	SD	M	SD	
Hospital	20.25	7.87	21.52	7.80	1.46
CE	22.06	6.69	24.64	5.49	1.93
Mint	15.48	8.29	16.22	8.62	.77
Pooled	18.87	8.33	20.35	8.35	2.46*

* $p < .05$.

Hosp: N = 93.

CE: N = 33.

Mint: N = 79.

Pooled: N = 193.

Table 9
 Control Groups--By Organization;
 PPDM--Across Time

Sample	Pretest		Posttest		t-statistic
	M	SD	M	SD	
Hospital	20.55	8.57	21.88	8.34	1.33
CE	21.67	7.40	21.43	7.52	.24
Mint	17.70	9.25	20.18	7.99	2.31*
Pooled	19.62	8.55	20.67	8.05	1.85

*p < .05.

Hosp: N = 64.

CE: N = 46.

Mint: N = 60.

Pooled: N = 187.

of the same test against the control group reveals only a small change in the level of PPDM.

Hypothesis three. The members of the mint QC work group experience an increase in their level of PPDM after participating in the QC for more than one year.

The mint QC group failed to yield a significant increase in member levels of PPDM over time. These findings fail to support the hypothesis. A check against the control group shows a significant increase in the subject variable. This implies that the level of PPDM in control group members actually increased over time.

Hypothesis four. The members of all three QC work groups collectively, experience an increase in their level of PPDM after participating in the QC for more than one year.

Examining the pooled sample results reveals a significant difference between the pre- and posttests of the QC groups. The QC members experienced higher levels of PPDM in the posttest ($\mu = 20.35$) when compared to the pretest ($\mu = 18.87$), thereby substantiating the hypothesis. No such change was found to be significant in the control group.

Research question #2. Do QC members have higher levels of PPDM than non-members?

Hypothesis five. Members of the hospital QC work group exhibit greater levels of PPDM than do non-members.

The results of the mean difference t-tests between the QC and control groups at the posttest are displayed in Table 10. No significant difference was found to exist between the two groups from the hospital sample. The hypothesis could, therefore, not be substantiated.

Hypothesis six. The members of the civil engineering QC work group exhibit greater levels of PPDM than do non-members.

The civil engineering sample yielded significant results ($t = 2.57$). The QC group ($\mu = 24.64$) was significantly higher than the control group ($\mu = 20.90$) at posttest. These results corroborate the hypothesis.

Hypothesis seven. The members of the mint QC work group exhibit greater levels of PPDM than do non-members.

Although the t-statistic between the pre- and posttests of the mint QC groups is significant, a closer examination of the results reveals that the mean for the control group ($\mu = 19.24$) is significantly higher than

Table 10
 QC and Control Groups--By Organization;
 PPDM--Posttest Survey

Sample	Pretest		Posttest		t-statistic
	M	SD	M	SD	
Hospital	21.88	8.34	21.34	7.94	.40
CE	20.90	7.80	24.64	5.49	2.57*
Mint	19.24	8.53	16.15	8.59	2.28*
Pooled	20.47	8.16	19.90	8.51	.70

*p < .05

Control groups:	Hosp: N = 64.	QC groups:	Hosp: N = 94.
	CE: N = 51.		CE: N = 33.
	Mint: N = 80.		Mint: N = 80.
	Pooled: N = 193.		Pooled: N = 214.

that of the QC group ($\mu = 16.15$). This indicates that the level of Perceived Participative Decision Making is actually higher among control group members than QC members. These results do not support the hypothesis.

Hypothesis eight. The membership of the three QC work groups collectively, exhibit greater levels of PPDM than do non-members.

The test between the control and QC groups of the pooled sample did not yield a significant t-statistic. An additional test, analysis of covariance, was also performed. The purpose of the analysis was to assess the posttest levels of PPDM for both the QC and control groups after controlling for the pretest PPDM levels. The F value ($F = .007$) was not significant and the hypothesis could not be confirmed.

Summary of results. The analysis identified a mixed bag of results. Two of the eight hypotheses were found to be statistically supported, while no other significant results emerged from the other six. The two supported hypotheses included numbers four and six. Hypothesis four contended that the members of the pooled sample would experience an increase in their level of PPDM after participating in the QC for more than a year. Hypothesis six stated that the civil engineering QC members would experience higher levels of PPDM than non-members.

V. Discussion, Conclusions, and Recommendations

Introduction

This research effort was undertaken to determine the relationship between Quality Circle interventions and individual levels of Perceived Participative Decision Making in three U.S. Government organizations. It was hypothesized that the introduction of QCs would increase member levels of PPDM in these organizations. Several tests were conducted with the purpose of isolating the QC effect on the PPDM variable. Tests concerning instrument reliability and group equivalency were also initiated to enhance the overall validity of the study. Following is a discussion of the findings from the preceding chapter along with some conclusions and recommendations for future research.

Discussion

The basic framework for this study was established by the two research questions presented in Chapter I. The first question asked if an employee's level of PPDM would increase as a function of time if he practiced in a QC. The analysis of this question brought very interesting results. While none of the individual organizational

samples showed a significant PPDM increase over time in their QC groups, the pooled sample of organizations did. The control group of the pooled sample reveals that the level of PPDM also increased over the same period, but the change was not large enough to generate a significant t-statistic. Although the increase in the control group did not prove significant, it raised some question as to the influences behind the change in the QC group of the pooled sample. Was the change solely due to the QC intervention or did other events influence enough change over time to cause a significant result? There are many factors which may influence results in tests done over time. Some of them include: effects due to instrumentation, maturity and experiment mortality (Emory, 1980). If these types of effects proved to be a significant factor in our experiment, we would expect to find no significant difference between the posttests of the QC and control groups of the same sample. This point is addressed under the second research question.

The second research question focused on finding out if QC members exhibit higher levels of PPDM than non-members. Only one of the corresponding hypotheses was found to be supported by the results. Members of the civil engineering sample showed significantly higher levels of PPDM than non-members. The failure of the other samples, especially the pooled sample, to show a difference between

QC and control groups was of particular interest. The fact that the pooled sample failed to show a significant difference between groups strengthens the possibility that factors other than the QC intervention influenced the pooled sample from pre- to posttest.

The mixed bag of results raises a number of issues concerning this study's samples, design and conceptual framework. The remainder of this section is devoted to explaining some of these implications in order to help bridge the gap between the stated hypotheses and results.

The samples used in this study were from three different settings, a hospital, mint and civil engineering organization. Only the civil engineering sample showed a significant increase in PPDM due to the QC intervention. One explanation for the lack of response of the other two samples may lie in their organizational climates. Consider for a moment, a production-oriented organization like the mint. The tasks are likely to be highly programmed with little or no autonomy. After joining QCs, individuals may realize there is little they can do to bring about changes in their job and regret their decision to join. These feelings may actually lead to lower levels of PPDM in QC members. This would, in part, explain the significantly higher level of PPDM in the mint's control group over its corresponding QC group at the posttest.

The hospital setting is quite different from the industrial type settings of the civil engineering and mint units. Inside the hospital are a number of independent departments which, to a large extent, make their own policies and work practices. Tasks are generally specialized, allowing workers flexibility and control over them. The grouping of these tasks under QCs may have done little to enhance individual decision making since members were used to making their own decisions about their job.

Another issue surrounding the samples used in this study is the possible lack of equivalency between groups. While the demographic analysis showed only two variables, grade level and education, to be different between some of the groups, it is impossible to know just what effect the differences might have had on the results. Whenever selections of groups are not randomized, the equivalency between groups is particularly suspect.

The implementation and control of the QC process may have been faulty. Consider the instance where the designers or managers of the QC were deficient in promoting a participative atmosphere. Shelby and Werner (1981) provide a list of prerequisites that should be followed by management when developing and implementing QCs. Deviation from these QC philosophies could very well threaten the participative approach that these circles were designed to purport (Mohr & Mohr, 1983). It is possible

that faulty management may have been present in some of the organizations used in this study. In their critique of the hospital organization included in this study, Steel, Mento, Dilla, Ovalle, and Lloyd (1985) suspected bad management practices to be the cause of the organization's lack of response to the QC interventions.

The design of this experiment may have also been responsible for the inconclusive results. While researchers are often quick to turn to their methodology to help explain undesired results, it is important to keep in mind that most of the past research done on QCs has been deficient in this area. A comprehensive list of limitations on the nonequivalent design (used in this study) can be found in Emory (1980). Some of these limitations and their implications are discussed below.

The AFIT measurement instrument used in this study was designed to operationalize "PDM in terms of the employee's perceptions of the degree of influence he or she has over decisions that affect his or her work" (Steele & Mento, 1984, p. 12). The reliability of the instrument was relatively high in measuring the samples of this study. This is no guarantee, however, that the instrument was successful in accurately measuring levels of PPDM. Because of limitations on the scope of this research effort, follow-up interviews were not conducted to help substantiate the results. In one of the most

rigorous QC evaluations ever to be conducted, Sander and Atwater (1983) utilized follow-up interviews and found that

when people are asked face-to-face what the effects of QCs have been, they perceive many positive changes, yet when changes in these areas (e.g., communication attitude changes) are measured before QCs are implemented and again one year after implementation, these data do not corroborate these testimonies. (p. 217)

Boredom and fatigue of respondents are cited as two of the greatest threats to the success of survey instruments (Emory, 1980).

Maturation effects may have also played a significant role in influencing the results of this study. QC workers may have become tired or bored with the QC process or grown to expect more out of the process as time passed. Happenings such as these were not measured by the instruments used in the three organizations of this study.

Experiment mortality refers to the changing composition of groups between pre- and post-measures. Emory (1980) points out that the attrition rate is especially likely to be high in the treatment group. Mortality of group members can usually be attributed to such things as voluntary disenrollment from the groups, turnover and intra-organizational transfers. Military organizations, like the two that were included in this study, are particularly prone to subject mortality, since assignment rotation and job transfers occur frequently (Steel & Shane, 1985). This source of bias could quite possibly

have had a significant impact on the results of the study.

The conceptual assumption on which this study was built may have been faulty. Perhaps there is no relationship between QCs and PPDM as proposed in the hypotheses. Similar studies performed in the past have echoed the inconclusive results generated in this study, and raised questions about the existence of such a relationship.

There were two main points brought out earlier when discussing the expectations of PPDM levels in QCs. The first point revolves around the premise that Quality Circles represent a form or style of participative management. The second point was that individuals join QCs in order to help fulfill their need for involvement in the PDM process. With these two points in mind, it was argued that individuals would experience higher levels of PPDM if they belonged to a QC. A combination of literature and past research was used to support these points, but there is no overwhelming evidence of their truth.

Perhaps a set relationship does indeed exist between PPDM and QCs but hinges on certain situational factors. Consider, for instance, the way in which management may utilize a Quality Circle program. As mentioned earlier, most QCs do not have the authority to make final decisions. Instead, they recommend a decision to management for action. It logically follows that if management routinely

accepts and implements QC recommendations, the QC ultimately becomes the decision-making body. In these cases, the level of PPDM among QC members should be relatively high. But what about those cases where QC recommendations are not put into action by management? Even in the most well-designed and managed QCs, participants are bound to become discouraged and experience low levels of PPDM if their recommended decisions are never put into action. Situational factors may, therefore, prove to be significant influences on the QC members' level of PPDM.

Conclusions

This study examined the relationship between Quality Circles and Participative Decision Making in three organizations. The literature on QCs had, for the most part, classified them as a management approach which encouraged participation in the decision-making process. Because of this, it was argued in this study that employees would experience an increase in their level of Perceived Participative Decision Making if they participated in a QC.

Unfortunately, the results generated from this study were inconclusive. Only one of the three individual organizations experienced a significant change in PPDM. When pooled together, the organizations showed inconclusive results. A significant change in PPDM was detected over time in the QC groups but no such difference existed

between the posttests of the QC and control groups. Inconclusive results do not mean, however, that this research effort was done in vain. Instead, this effort can be added to the expanding Quality Circle research base with the intent of shedding some light on the participative nature of QCs in the federal sector.

Recommendations

A great deal of resources have been invested into implementing and operating Quality Circles in the federal sector. Enthusiasm behind the relatively new management approach appears to be rather high, but is destined to die out unless effectiveness can somehow be justified. A better understanding of the QC process and its effect on organizational and attitudinal variables is needed and evidenced by the shortage of research in these areas. By understanding the QC intervention, researchers will be better able to access its effectiveness. In particular, the author recommends the following:

1. Objective evaluations should be undertaken to access the training, implementation and management of QCs.
2. Research, combining both subjective (interview) and objective (survey) measures, should be conducted on the organizational and attitudinal variables suspected to be affected by the intervention of QCs.

3. Evaluations should be performed to try and find those environmental characteristics that are most conducive to the success of QC interventions.

Appendix A: AFIT Survey of Work Attitudes:

Demographic Items

This section of the survey contains several items dealing with personal characteristics. This information will be used to obtain a picture of the background of the "typical employee."

1. Your age is:

1. Less than 20
2. 20 to 25
3. 26 to 30
4. 31 to 40
5. 41 to 50
6. 51 to 60
7. More than 60

2. Your highest educational level obtained was:

1. Non high school graduate
2. High school graduate or GED
3. Some college work
4. Associate degree or LPN
5. Bachelor's degree or RN
6. Some graduate work
7. Master's degree
8. Doctoral degree

3. Your sex is:

1. Male
2. Famale

4. Total months in this organization is:

1. Less than 1 month
2. More than 1 month, less than 6 months
3. More than 6 months, less than 12 months
4. More than 12 months, less than 18 months
5. More than 18 months, less than 24 months
6. More than 24 months, less than 36 months
7. More than 36 months

5. How many people do you directly supervise (i.e., those for which you write performance reports)?
 1. None
 2. 1 to 2
 3. 3 to 5
 4. 6 to 8
 5. 9 to 12
 6. 13 to 20
 7. 21 or more
6. You are a (an):
 1. Officer
 2. Enlisted
 3. Civilian (GS)
 4. Civilian (WG)
 5. Non-appropriated Fund (NAF employee)
 6. Other
7. Your grade level is:
 1. 1-2
 2. 3-4
 3. 5-6
 4. 7-8
 5. 9-10
 6. 11-12
 7. 13-15
 8. Senior Executive Service

Appendix B: AFIT Survey of Work Attitudes:

Participative Decision Making Items

This section of the questionnaire contains a number of statements that relate to feelings about your work group, the demands of your job, and the supervision you receive. Use the following rating scale to indicate the extent to which you agree or disagree with the statements shown below.

- 1 = Strongly disagree
- 2 = Moderately disagree
- 3 = Slightly disagree
- 4 = Neither agree nor disagree
- 5 = Slightly agree
- 6 = Moderately agree
- 7 = Strongly agree

50. Within my work-group the people most affected by decisions frequently participate in making the decisions.
51. In my work-group there is a great deal of opportunity to be involved in resolving problems which affect the group.
52. I am allowed to participate in decisions regarding my job.
53. I am allowed a significant degree of influence in decisions regarding my work.
54. My supervisor usually asks for my opinions and thoughts in decisions affecting my work.

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The use of Quality Circles (QCs) as an organizational development intervention, has gained increasing popularity over the past few years in the federal sector. Much of the recent attention concerning QCs has been centered around understanding the organizational and attitudinal variables inherent in the QC process. It is theorized that by understanding these variables, researchers are better able to evaluate the effectiveness of QC interventions.

^{thesis} This research effort set out to determine the relationship between one particular attitudinal variable, Participative Decision Making (PDM) and the intervention of QCs. QC programs in organizations within the federal sector were studied utilizing a nonequivalent control group design. Statistical tests used to facilitate evaluation of the data included the independent mean and paired difference t-tests and Cronbach's Alpha Reliability Coefficient technique. The evaluation of the data produced mixed results dealing with the relationship between PDM and QCs.

A better understanding of the QC process and its effects on organizational and attitudinal variables is needed and evidenced by the shortage of research in these areas. By understanding the QC intervention, researchers will be better able to assess its effectiveness. *Keywords:*

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